

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Masato Katayama)
) Group Art Unit: 1616
Serial No.: 09/931,193)
)
Filed: 08/15/2001) Examiner: Pryor, Alton Nathaniel
)
For: ROOTS INDUCING AGENT OF PLANTS)
 AND ITS TREATMENT METHOD)

Commissioner for Patents
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REVISED APPEAL BRIEF

I. REAL PARTY IN INTEREST

The real parties in interest are Masato Katayama and Eiji Kageyama, the inventors of the invention disclosed and claimed in the patent application subject of this appeal.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences known to Appellants or Appellants' legal representatives that will directly affect, be directly affected by, or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 5-11, 13, 15-18, and 20-24 are pending in the application.

Claims 1-4, 12, and 14 have been cancelled.

As of the Office Action dated May 20, 2005, claims 5-6, 9, 11, 15-18, 20, and 23 stand twice rejected and form the basis for this appeal.

Further as of the Office Action dated May 20, 2005, claims 7-8, 10, 13, 21-22, and 24 stand objected to as being dependent upon a rejected base claim, and allowable if rewritten in dependent form including all of the limitations of the base claim and any intervening claim.

All pending claims are presented as Appendix I of this Appeal Brief.

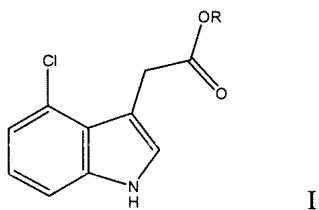
IV. STATUS OF AMENDMENTS

An After Final Amendment is submitted with this Appeal Brief. In the Amendment, objected-to claims 7-8, 10, 13, 21-22, and 24 have been rewritten as independent claims, including the limitations any intervening dependent claims.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Applicants' invention is generally directed to a root-inducing system and method that provides a streamlined means to effectuate root growth on plants or plant cuttings lacking any root system. In particular, the instant claims require a spray system or a method for application of a specific root-inducing compound to a leaf of a rootless cutting.

Independent Claim 1 is directed to a root-inducing system that includes a rootless cutting having a leaf and a sprayer. In particular, the system comprises a solution comprising water and a root inducing compound of formula I



wherein R is selected from the group consisting of hydrogen, allyl, methyl, ethyl, 1-propyl, 2-propyl, 1-butyl, isobutyl, (R)2-butyl, (S)2-butyl, tert-butyl and 1-pentyl; a rootless cutting having at least one leaf; wherein the root inducing compound of formula I is in a concentration sufficient to induce the generation of roots from the rootless cutting when the solution is applied to the at least one leaf of the rootless cutting; and a sprayer to apply the solution to the rootless cutting.

The invention improves upon prior art root-inducing systems that required several laborious and time-consuming steps. Prior art methods consisted of applying a root-inducing agent directly to the cut surfaces of the stems or leaves prior to implantation of the cutting into growth supporting soil. (Specification, pages 1-2) Specifically, application of the root-inducing agent was accomplished by powdering the cut surface directly, or by soaking or dipping the cut surface in a solution containing the agent. (Specification, pages 1-2) These methods required that every cut stem or leaf be powdered, dipped or soaked independently, resulting in a repetitive and inefficient process. (Specification, page 2) Furthermore, once the stem or leaf cutting has been planted into cultivation soil, subsequent application of the root-inducing agent is impractical. To overcome these problems, the Applicants advantageously discovered a novel root-inducing system, wherein the root-inducing agent is applied directly to the leaves of cuttings.

The claimed system eliminates the need to independently powder, soak or dip each cutting. The present invention can be used to simultaneously apply the root-inducing compound to multiple stem and leaf cuttings. (Specification, page 4) For example, multiple stem or leaf cuttings can be planted and the leaves can be sprayed directly with the solution comprising water and the root-inducing compound. (Specification, pages 3-4) In addition,

the claimed system also allows for repeated application of the root-inducing agent to stem or leaf cuttings. (Specification, pages 3-4)

Furthermore, the claimed root-inducing system can be adapted for use with a sprayer carried on the back of an individual, to a sprinkler system equipped in a cultivation house, or to a pipe used to circulate water. (Specification, page 9) Thus, the claimed invention eliminates the laborious steps found in the prior art methods and provides an efficient system for applying root-inducing agents to rootless cuttings.

Independent Claim 16 is directed to a root-inducing combination comprising a solution selected from the group consisting of water, alcohols and organics; a root inducing compound of formula I as set forth in claim 1, wherein the solution is mixed with the compound until a liquid having a concentration of 10^{-7} to 10^{-2} M of the compound is formed; and a rootless cutting having at least one leaf with a surface, wherein the liquid is applied to the surface of the at least one leaf to induce root formation in the rootless cutting.

Independent Claim 17 is directed to a method for promoting root formation on cuttings from plants comprising providing a solvent; providing a root inducing compound; wherein the root inducing compound is capable of generating root formation in a rootless cutting; mixing the root inducing compound with the solvent to form a liquid; and applying the liquid to a plant leaf of the rootless cutting to induce root formation.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Claims 5, 6, 9, 11, 15-18¹, and 23 stand rejected under 35 U.S.C. § 103(a) over Ahmad et al., *Physiologia Plantarum*, 1987, Vol. 69(1), 137-140 (“Ahmad”).

2. Claims 5, 6, 9, 15-18, 20, and 23 stand rejected under 35 U.S.C. § 103(a) over Katayama, *Bioscience, Biotechnology, Biochemistry*, 2000, Vol. 64(4) 808-815 (“Katayama”).

VII. ARGUMENT

1. **Claims 5, 6, 9, 11, 15-18, and 23 are patentable over Ahmad et al.**

¹ In the rejection, it is stated that claims 11-18 are rejected over Ahmad et al.; since claims 12 and 14 have been canceled and claim 13 is objected to, it has been assumed that the rejection applies to claims 11 and 15-18.

Claims 5, 6, 9, 11, 15-18, and 23 stand twice rejected under 35 U.S.C. §103 as allegedly obvious over Ahmad et al. (Office Action dated May 20, 2005, page 2)

In making the rejection, the Examiner states:

Ahmad teaches a method of applying chlorinated auxins, including, for example, 4-chloroindole-3-acetic acid, to pea cuttings (shoot, leaf) in order to promote root growth. It is inherent that the 4-Cl-IAA would be administered to the cuttings in a carrier (solvent). See Abstract.

(Office Action dated May 20, 2005, page 2)

As noted above, Applicants' invention requires that system comprise a sprayer, or that the solution comprising a root-inducing compound is applied to the leaf of the rootless cutting. Ahmad does not teach a system using a sprayer, or applying 4-Cl-IAA, or any root-inducing compound, to the shoot or leaf of the pea cutting.

Applicants respectfully disagree with the Examiner's characterization of the Ahmad Abstract. Further, to the extent that the Examiner suggests the application of 4-Cl-IAA to the leaf of a cutting is inherent in Ahmad, Applicants respectfully disagree. For convenience, the Ahmad Abstract is set forth below:

In pea cuttings (*Pisum sativum* L. cv. Alaska) we measured shoot and root growth and ethylene production in response to 4-chloroindole-3-acetic acid (4-Cl-IAA) or 4,6-chloroindole-3-acetic acid (4,6-Cl₂-IAA). Leafy cuttings treated basally with either of the chlorinated auxins in high concentrations showed permanent epinasty, lost of apical growth and dominance resulting in the outgrowth of laterals from the lower-most axillary bud. The naturally occurring (4-Cl-IAA) was a better root promotor than the synthetic 4,6-Cl₂-IAA which inhibited rooting. Both chloroindole auxins induced very high ethylene evolution, which lasted much longer than the ethylene evolution after IAA treatment.

(Underlining added; Abstract)

The Ahmad Abstracts describes measuring shoot and root growth after treating the pea cuttings basally with chlorinated auxins. (Abstract) This is further illustrated in the Materials and Method section of Ahmad, which states that "the auxins were fed by dipping the lower 1 cm of the cutting 5 min and placed in standard nutrient solution . . ." (Ahmad at page 128, 1st paragraph). Ahmad is silent regarding the application of 4-chloroindole-3-acetic acid, or any

other root inducing compounds, to a surface of a leaf face of the root cutting by a sprayer or other method.

Ahmad clearly discloses dipping rootless cuttings in a solution containing root inducing agents. This is consistent with what was known in the prior art at the time the application was filed. Applicants' invention is designed to avoid the laborious and inefficient prior art process of dipping or soaking rootless cuttings in root inducing solutions. Since Ahmad does not teach applying a solution comprising a root-inducing agent to the leaf of the root cutting by a sprayer or other method, it does not teach all elements of the claims.

Based on the above discussion, Ahmad does not teach all limitations of the claims. Additionally, Ahmad does not contain any language that would have motivated one of ordinary skill in the art to apply a solution comprising a root-inducing compound to the leaf of a rootless cutting, or the use of a sprayer to apply the solution to the leaf of a rootless cutting. With respect to the spraying limitation, the Examiner stated, "the prior art uses various methods to deliver chemicals to plant cutting including the spraying." (Office Action Dated 5/20/2005, page 2) The present invention requires the application of the solution to the leaf of the rootless cutting. Ahmad teaches dipping the lower 1 cm of a rootless cutting into a solution containing auxins. Ahmad does not suggest spraying the leaf of a rootless cutting. In addition, to applicants' knowledge, any prior art disclosures teaching the spraying of plants to deliver chemical are directed to plants having *existing* root structures, and not to the leaves of plant cuttings (i.e., rootless cuttings) for the purpose of inducing root-growth. One of ordinary skill in the art, upon reading Ahmad, would not be aware that application of the solution comprising a root-inducing agent to the leaf of a rootless cutting would be effective in promoting root growth. One of ordinary skill in the art, upon reading Ahmad, further would have no reasonable expectation of success that application of the solution comprising a root-inducing agent to the leaf of a rootless cutting would be effective in promoting root growth.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a *prima facie* case of obviousness, i.e., that all elements of the invention are disclosed in the prior art; that the prior art relied upon, coupled with knowledge generally available in the art at the time of the invention, contain some suggestion or incentive that

would have motivated the skilled artisan to modify a reference or combined references; and that the proposed modification of the prior art had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988).

Here, Ahmad does not application of the claimed root-inducing solution to a surface of a leaf, does not provide any motivation to one of ordinary skill in the art to apply the solution to the surface of a leaf, and provides no expectation that application to a surface of a leaf would successfully induce root growth. Applicants therefore respectfully submit that Ahmad does not establish *prima facie* obviousness of claims 5, 6, 9, 11, 15-18, and 23.

2. Claims 5, 6, 9, 11-18, 20, and 23 are patentable over Katayama.

Claims 5, 6, 9, 11, 15-18, 20, and 23 stand rejected under 35 U.S.C. §103 as allegedly unpatentable over Katayama et al. (Office Action dated May 20, 2005, pages 2-3) According to the Examiner, “Katayama teaches a method of applying 4-chloroindole-3-acetic acid to cuttings in order to promote root growth. It is inherent that the 4-Cl-IAA would be administered to the cuttings in a carrier (solvent). See abstract.” (Office Action dated May 20, 2005, page 3)

To the extent that the Examiner suggests that application of 4-Cl-IAA to the leaf of a cutting is inherently disclosed by Katayama, Applicants respectfully disagree. The Katayama Abstract discusses results obtained using 4-Cl-IAA and its esters in four bioassays, but nothing in the Abstract requires the compounds to have been applied by a sprayer, or applied to the leaf surface of a rootless leaf cutting. To be inherent, a result must necessarily flow from the teachings of the prior art. *In re Oelrich*, 666 F.2d 578, 581, 212 U.S.P.Q. 323, 326 (C.C.P.A. 1981) (holding that inherency must flow as a necessary conclusion from the prior art, not simply a possible one).

In fact, the Materials and Method section of Katayama discloses the application of test compounds to by a variety of methods, none of which uses a sprayer, or involves application to only a leaf of a rootless cutting. In the *Avena elongation test* described in the last paragraph at the bottom of page 808, coleoptiles (the pointed protective sheath covering the emerging

shoot in monocotyledons such as oats and grasses) are excised, grown for three days, and exposed to the test compounds by soaking the coleoptiles a solution containing sucrose and the test compound. The coleoptiles are not sprayed. In the *Hypocotyl growth inhibition* and *Hypocotly swelling and lateral* tests described at the first and second full paragraphs of page 809, seedlings are contacted with a filter paper soaked with the test compounds. In the *Adventitious root formation test* described at the last paragraph of column 1 of page 809, the stems of *Serissa japonica* cuttings (22 cm long) are soaked in solutions containing the test compounds.

The Katayama disclosure is consistent with what was know in the art at the time the present application was filed. Applicant's invention requires that the solution comprising a root-inducing compound be sprayed onto the leaf of the rootless cutting. Since Katayama does not teach spraying a solution comprising a root-inducing agent to the leaf of the root cutting by a sprayer, it does not teach all of the limitations of the claims.

Furthermore, the Katayama does not contain any language that would have motivated one of ordinary skill in the art to apply a solution comprising a root-inducing compound to the leaf of a rootless cutting, or the use of a sprayer to apply the solution to the leaf of a rootless cutting. With respect to the spraying limitation, the Examiner states that "the prior art uses various methods to deliver chemicals to plant cutting including the spraying." (Office Action, page 3) Even if true, neither Katayama nor the prior art provides motivation to spray a root-inducing compound onto a leaf, or provides any expectation of success in so doing. One of ordinary skill in the art, upon reading Katayama, would not be aware that application of the solution comprising a root-inducing agent to the leaf of a rootless cutting would be effective in promoting root growth.

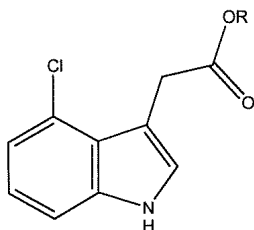
In summary, since Katayama does not teach all the elements of the claimed invention, and in addition does not provide any motivation to one of ordinary skill in the art to arrive at the claimed invention, or any reasonable expectation of success. Applicants respectfully submit that there is no *prima facie* obviousness over Katayama, and request reversal of the rejection of the claims

VIII. CLAIMS APPENDIX

The claims below are based upon entry of the Amendment After Final submitted with this Revised Appeal Brief.

Claims 1-4 (Canceled)

Claim 5. (Currently Amended) A root-inducing system comprising:
a solution comprising water and a root inducing compound of formula I

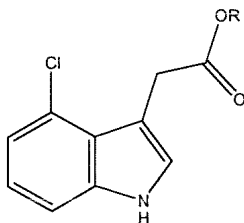


wherein R is selected from the group consisting of hydrogen, allyl, methyl, ethyl, 1-propyl, 2-propyl, 1-butyl, isobutyl, (R)2-butyl, (S)2-butyl, tert-butyl and 1-pentyl;
a rootless cutting having at least one leaf;
wherein the root inducing compound of formula I is in a concentration sufficient to induce the generation of roots from the rootless cutting when the solution is applied to the at least one leaf of the rootless cutting; and
a sprayer to apply the solution to the rootless cutting.

Claim 6. (Previously presented) The root-inducing system of claim 5 wherein the compound has a concentration of 10^{-7} to 10^{-2} M.

Claim 7. (Currently amended) A root-inducing system comprising:

a solution comprising water, an alcohol, and a root inducing compound of formula I



wherein R is selected from the group consisting of hydrogen, allyl, methyl, ethyl, 1-propyl, 2-propyl, 1-butyl, isobutyl, (R)2-butyl, (S)2-butyl, tert-butyl and 1-pentyl;

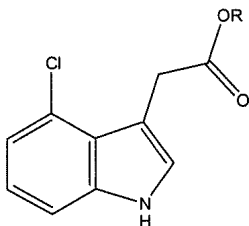
a rootless cutting having at least one leaf;

wherein the root inducing compound of formula I is in a concentration sufficient to induce the generation of roots from the rootless cutting when the solution is applied to the at least one leaf of the rootless cutting; and

a sprayer to apply the solution to the rootless cutting.

Claim 8. (Currently amended) A root-inducing system comprising:

a solution comprising water, a polyoxyethylenealkyl phenyl ether, and a root inducing compound of formula I



wherein R is selected from the group consisting of hydrogen, allyl, methyl, ethyl, 1-propyl, 2-propyl, 1-butyl, isobutyl, (R)2-butyl, (S)2-butyl, tert-butyl and 1-pentyl;

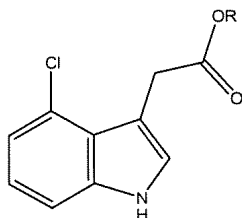
a rootless cutting having at least one leaf;

wherein the root inducing compound of formula I is in a concentration sufficient to induce the generation of roots from the rootless cutting when the solution is applied to the at least one leaf of the rootless cutting; and

a sprayer to apply the solution to the rootless cutting.

Claim 9. (Previously presented) The root-inducing system of claim 5 further comprising:
an organic solvent.

Claim 10. (Currently amended) A root-inducing system comprising:
a solution comprising water, xylene, and a root-inducing compound of formula I



wherein R is selected from the group consisting of hydrogen, allyl, methyl, ethyl, 1-propyl, 2-propyl, 1-butyl, isobutyl, (R)2-butyl, (S)2-butyl, tert-butyl and 1-pentyl;

a rootless cutting having at least one leaf;

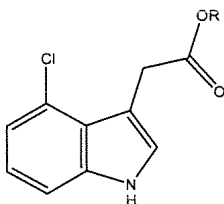
wherein the root-inducing compound of formula I is in a concentration sufficient to induce the generation of roots from the rootless cutting when the solution is applied to the at least one leaf of the rootless cutting; and

a sprayer to apply the solution to the rootless cutting.

Claim 11. (Previously presented) The root-inducing system of claim 5 further comprising:
a beneficial agricultural chemical, wherein the beneficial agricultural chemical is selected from the group consisting of fertilizers, spreading agents and plant growth regulators.

Claim 12. (Canceled)

Claim 13. (Currently amended) A root-inducing system comprising:
a solution comprising water, a nonyl phenyl ether, and a root-inducing compound of formula I

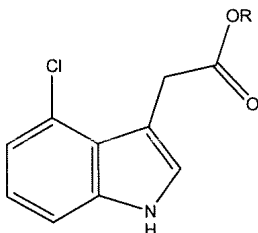


wherein R is selected from the group consisting of hydrogen, allyl, methyl, ethyl, 1-propyl, 2-propyl, 1-butyl, isobutyl, (R)2-butyl, (S)2-butyl, tert-butyl and 1-pentyl;
a rootless cutting having at least one leaf;
wherein the root-inducing compound of formula I is in a concentration sufficient to induce the generation of roots from the rootless cutting when the solution is applied to the at least one leaf of the rootless cutting; and
a sprayer to apply the solution to the rootless cutting.

Claim 14. (Canceled)

Claim 15. (Previously presented) The root-inducing system of claim 5 further comprising:
an automated sprinkling system wherein said sprayer is permanently affixed to said automated sprinkling system.

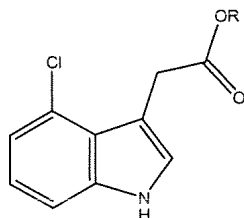
Claim 16. (Previously presented) A root-inducing combination comprising:
a solution selected from the group consisting of water, alcohols, and organics;
a root inducing compound of formula I



wherein R is selected from the group consisting of hydrogen, allyl, methyl, ethyl, 1-propyl, 2-propyl, 1-butyl, isobutyl, (R)2-butyl, (S)2-butyl, tert-butyl and 1-pentyl;
wherein the solution is mixed with the compound until a liquid having a concentration of 10^{-7} to 10^{-2} M of the compound is formed; and,
a rootless cutting having at least one leaf with a surface, wherein the liquid is applied to the surface of the at least one leaf to induce root formation in the rootless cutting.

Claim 17. (Currently amended) A method for promoting root formation on cuttings from plants comprising:
providing a solvent;
providing a root inducing compound, wherein the root inducing compound is capable of generating root formation in a rootless cutting,
mixing the root inducing compound with the solvent to form a liquid;
applying the liquid to a plant leaf of the rootless cutting to induce root formation.

Claim 18. (Currently amended) The method of claim 17 further comprising:
providing a root inducing compound of formula I



wherein R is selected from the group consisting of hydrogen, allyl, methyl, ethyl, 1-propyl, 2-propyl, 1-butyl, isobutyl, (R)2-butyl, (S)2-butyl, tert-butyl and 1-pentyl; and
forming a concentration of 10^{-7} to 10^{-2} M of the root inducing compound of formula I.

Claim 19. (Canceled)

Claim 20. (Previously presented) The method of claim 17 further comprising:

adding beneficial agricultural chemical, wherein the beneficial agricultural chemical is selected from the group consisting of fertilizers, spreading agents and plant growth regulators.

Claim 21. (Currently amended) A method for promoting root formation on cuttings from plants comprising:

providing a solvent;
providing a root-inducing compound, wherein the root inducing compound is capable of generating root formation in a rootless cutting;
adding sodium dodecylbenzenesulfonate;
mixing the root inducing compound with the solvent to form a liquid;
applying the liquid to a plant leaf of the rootless cutting to induce root formation.

Claim 22. (Currently amended) A method for promoting root formation on cuttings from plants comprising:

- providing a solvent;

- providing a root inducing compound, wherein the root inducing compound is capable of generating root formation in a rootless cutting;

- adding nonyl phenyl ether;

- mixing the root inducing compound with the solvent to form a liquid;

- applying the liquid to a plant leaf of the rootless cutting to induce root formation.

Claim 23. (Previously presented) The method of claim 17 further comprising:

- placing the liquid in a sprayer capable of containing the solution.

Claim 24. (Currently amended) A method for promoting root formation on cuttings from plants comprising:

- selecting a stem without roots having at least one leaf;

- positioning the stem into a soil plug;

- providing a solvent;

- providing a root-inducing compound, wherein the root inducing compound is capable of generating root formation in a rootless cutting,

- mixing a root-inducing compound with the solvent to form a liquid;

- applying the liquid to a plant leaf of the rootless cutting to induce root formation.

IX. EVIDENCE APPENDIX

No evidence has been submitted pursuant to sections 1.130, 1.131, or 1.132 of this title in connection with this appeal brief.

X. RELATED PROCEEDINGS APPENDIX

There are no other related appeals or interferences known to Appellants, Appellants' legal representatives, or assignee that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

XI. CONCLUSION

In summary, Claims 5-6, 9, 11, 15-18, 20, and 23 are non-obvious over the art of record. For the reasons cited above, Appellants respectfully submit that all of the claims are allowable and the application is in condition for allowance. Appellants respectfully request reversal of the outstanding rejections and allowance of this application.

In the event the Examiner has any queries regarding the submitted arguments, the undersigned respectfully requests the courtesy of a telephone conference to discuss any matters in need of attention.

If there are any additional charges with respect to this Appeal Brief, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

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